

What is claimed is:

1. A substrate processing apparatus for supplying a substrate to be processed with processing gas and solvent vapor, comprising:

a processing container for accommodating the substrate therein;

a processing-gas supplier for supplying the processing gas into the processing container;

a solvent-vapor generator for generating the solvent vapor to be supplied into the processing container; and

a solvent-vapor nozzle arranged in the processing container and also connected to the solvent-vapor generator,

wherein the solvent-vapor nozzle includes a nozzle body having a plurality of nozzle orifices formed at appropriate intervals and a condensation-proof mechanism for preventing dewdrops from being formed in an inside space of the nozzle body.

2. A substrate processing apparatus as claimed in Claim 1, wherein the condensation-proof mechanism comprises a heater for heating the inside space of the nozzle body.

3. A substrate processing apparatus as claimed in Claim 1, wherein the condensation-proof mechanism comprises a drain port formed on the bottom of the nozzle body to communicate the inside space of the nozzle body with an outside thereof.

4. A substrate processing apparatus as claimed in Claim 3, wherein the drain port is arranged on the side of one end of the nozzle body.

5. A substrate processing apparatus as claimed in Claim 4, wherein

the nozzle body is arranged beside a plurality of substrates in the processing container, and

the drain port of the nozzle body is positioned outside the outermost one of the plural substrates.

6. A substrate processing apparatus as claimed in Claim 4, wherein the drain port is arranged multiple ports in the circumferential direction of the one end of the nozzle body.

7. A substrate processing apparatus as claimed in Claim 3, wherein the drain port of the nozzle body is arranged so as not to face the substrate arranged in the processing container but to face the processing container's inner wall on the opposite side of the substrate.

8. A substrate processing apparatus as claimed in Claim 3, further comprising a heater arranged in the nozzle body.

9. A substrate processing apparatus for supplying a substrate to be processed with processing gas and solvent vapor, comprising:

a processing container for accommodating the substrate therein;

a processing-gas supplier for supplying the processing gas into the processing container;

a solvent-vapor generator for generating the solvent vapor to be supplied into the processing container; and

a solvent-vapor nozzle arranged in the processing container and also connected to the solvent-vapor generator,

wherein the processing container has its upper part formed with an inner wall which is reverse V-shaped so as to descend from the central part of the processing container toward both ends thereof.

10. A substrate processing apparatus as claimed in Claim 9, wherein the processing container is provided, in an upper part thereof, with a heater.

11. A substrate processing apparatus as claimed in Claim 9, wherein the processing container includes a container body having an upper part provided with a loading/unloading port

for loading and unloading the substrate, a container cover for closing up the loading/unloading port through a seal member, and a locking mechanism for fastening the container body to the container cover disengageably.

12. A substrate processing method for processing a substrate to be processed, by supplying processing gas and solvent vapor to the substrate accommodated in a processing container, the method comprising the steps of:

researching on a pressure of the solvent vapor in a condition before the solvent vapor is supplied into the processing container;

supplying the solvent vapor into the processing container on the basis of the pressure of the solvent vapor.

13. A substrate processing method as claimed in Claim 12, wherein the

researching step for the pressure of the solvent vapor in the condition before being supplied into the processing container, is carried out by firstly measuring a temperature of the solvent vapor in the condition before being supplied into the processing container and secondly calculating the pressure from the detected temperature.

14. A substrate processing method as claimed in Claim 12, wherein the

researching step for the pressure of the solvent vapor in the condition before being supplied into the processing container is carried out by firstly measuring a temperature of a liquid solvent that can generate the solvent vapor to be supplied into the processing container and secondly calculating the pressure from the detected temperature.

15. A substrate processing method as claimed in Claim 12, further comprising the step of supplying the processing gas into the processing container before supplying the solvent vapor into the processing container.

16. A substrate processing method for processing a substrate to be processed, by supplying processing gas and solvent vapor to the substrate accommodated in a processing container, the method comprising the steps of:

supplying the processing gas into the processing container;

elevating a pressure of the solvent vapor before being supplied into the processing container higher than a pressure of the processing gas in the processing container; and

supplying the solvent vapor, whose pressure has been elevated higher than the pressure of the processing gas in the processing container, into the processing container.

17. A substrate processing method as claimed in Claim 16, further comprising the step of controlling the pressure of the solvent vapor so as to be higher than a pressure of an atmosphere in the processing container, under condition that the pressure of the solvent vapor before being supplied into the processing container becomes higher than the pressure of the processing gas in the processing container.

18. A substrate processing method as claimed in Claim 17, wherein the step of controlling the pressure of the solvent vapor so as to be higher than the pressure of the atmosphere in the processing container is carried, in a closed space where the solvent vapor before being supplied into the processing container is present, by releasing the closed space for a constant period to discharge the solvent vapor of a constant quantity from the closed space so that the pressure of the solvent vapor becomes less than a first pressure which is higher than the pressure of the processing gas in the processing container.

19. A substrate processing apparatus for processing a substrate to be processed, by supplying processing gas and solvent vapor to the substrate accommodated in a processing

container, the apparatus comprising:

a processing-gas supplier for supplying the processing gas into the processing container;

a solvent-vapor generator for generating the solvent vapor to be supplied into the processing container; and

a pressure researcher for researching a pressure of the solvent vapor in the solvent-vapor generator.

20. A substrate processing apparatus as claimed in Claim 19, wherein the pressure researcher includes a temperature detector for detecting a temperature of the solvent vapor in the solvent-vapor generator and a pressure calculator for calculating a pressure of the solvent vapor in the solvent-vapor generator from the detected temperature.

21. A substrate processing apparatus as claimed in Claim 19, wherein the pressure researcher includes a liquid-temperature detector for detecting a temperature of a liquid solvent in the solvent-vapor generator and a pressure calculator for calculating a pressure of the solvent vapor in the solvent-vapor generator from the detected temperature.

22. A substrate processing apparatus for processing a substrate to be processed, by supplying processing gas and solvent vapor to the substrate accommodated in a processing container, the apparatus comprising:

a processing-gas supplier for supplying the processing gas into the processing container;

a solvent-vapor generator for generating the solvent vapor to be supplied into the processing container;

a first opening/closing unit interposed in a supply pipeline that supplies the solvent vapor generated in the solvent-vapor generator into the processing container;

a second opening/closing unit interposed in a discharge pipeline branching from the supply pipeline on the upstream side of the first opening/closing unit;

a pressure researcher for researching a pressure of the

solvent vapor in the solvent-vapor generator; and
a controller for controlling respective opening/closing operations of the first opening/closing unit and the second opening/closing unit on the basis of a detection signal outputted from the pressure researcher.

23. A substrate processing apparatus as claimed in Claim 22, wherein the controller controls the opening/closing operation of the second opening/closing unit on the basis of the detection signal so as to maintain the pressure of the solvent vapor within a constant range.

24. A substrate processing apparatus for processing a substrate to be processed, by supplying processing gas and solvent vapor to the substrate accommodated in a processing container, the apparatus comprising:

a processing-gas supplier for supplying the processing gas into the processing container;

a solvent-vapor generator for generating the solvent vapor to be supplied into the processing container;

a first opening/closing unit interposed in a supply pipeline that supplies the solvent vapor generated in the solvent-vapor generator into the processing container;

a second opening/closing unit interposed in a discharge pipeline branching from the supply pipeline on the upstream side of the first opening/closing unit;

a temperature detector for detecting a temperature of the solvent vapor in the solvent-vapor generator; and

a controller for controlling respective opening/closing operations of the first opening/closing unit and the second opening/closing unit on the basis of a detection signal outputted from the temperature detector.

25. A substrate processing apparatus as claimed in Claim 24, wherein the controller controls the opening/closing operation of the second opening/closing unit on the basis of the detection signal so as to maintain the temperature

of the solvent vapor within a constant range.

26. A substrate processing apparatus for processing a substrate to be processed, by supplying processing gas and solvent vapor to the substrate accommodated in a processing container, the apparatus comprising:

a processing-gas supplier for supplying the processing gas into the processing container;

a solvent-vapor generator for generating the solvent vapor to be supplied into the processing container;

a first opening/closing unit interposed in a supply pipeline that supplies the solvent vapor generated in the solvent-vapor generator into the processing container;

a second opening/closing unit interposed in a discharge pipeline branching from the supply pipeline on the upstream side of the first opening/closing unit;

a temperature detector for detecting a temperature of a liquid solvent in the solvent-vapor generator; and

a controller for controlling respective opening/closing operations of the first opening/closing unit and the second opening/closing unit on the basis of a detection signal outputted from the temperature detector.

27. A substrate processing apparatus as claimed in Claim 26, wherein the controller controls the opening/closing operation of the second opening/closing unit on the basis of the detection signal so as to maintain the temperature of the liquid solvent within a constant range.